DOCUMENT RESUME

ED 097 473 CE 002 239

| | |
|---|---|
| TITLE | Domestic Refrigerators; Appliance Repair--Advanced: 9027.03. |
| INSTITUTION | Dade County Public Schools, Miami, Fla. |
| PUB DATE | Jan 73 |
| NOTE | 20p.; An Authorized Course of Instruction for the Quinmester Program |
| EDRS PRICE | MF-$0.75 HC-$1.50 PLUS POSTAGE |
| DESCRIPTORS | *Appliance Repairing; Course Content; *Curriculum Guides; *Electrical Appliances; Electrical Appliance Servicemen; Refrigeration; Secondary Grades; Service Occupations; *Trade and Industrial Education |
| IDENTIFIERS | *Quinmester Program; Refrigerators |

ABSTRACT

This course outline is presented to provide the major appliance service student with a fundamental knowledge of the procedures necessary to repair a refrigerator using information on electrical circuitry and mechanical functioning components. The course may be taught in 90 or 135 clock hours, depending on the amount of detail presented and the provision of practice and skill development time. The course consists of five instructional blocks: orientation, domestic hermetic refrigeration systems, domestic refrigerator and freezer cabinets, servicing the domestic hermetic unit, and a post-test. Specific block objectives are outlined. An answer key to the two-part post-test is provided, and a bibliography lists basic and supplementary references, manufacturers manuals, audiovisual aids, filmstrips, and cassette tapes. (AG)

ED 097473

BEST COPY AVAILABLE

# AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

U.S. DEPARTMENT OF HEALTH
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

Course Outline
APPLIANCE REPAIR - ADVANCED - 9027
(Domestic Refrigerators)
Department 48 - Quin 9027.03

CEQ02334

DADE COUNTY PUBLIC SCHOOLS
DIVISION OF INSTRUCTION • 1973

D A D E  C O U N T Y  P U B L I C  S C H O O L S
1 4 5 0  N O R T H E A S T  S E C O N D  A V E N U E
M I A M I,  F L O R I D A  33132

ED 097473

Course Outline

# APPLIANCE REPAIR - ADVANCED - 9027
(Domestic Refrigerators)

Department 48 - Quin 9027.03

county office of
VOCATIONAL AND ADULT EDUCATION

THE SCHOOL BOARD OF DADE COUNTY

Mr. G. Holmes Braddock, Chairman
Mr. William H. Turner, Vice-Chairman
Mrs. Ethel Beckham
Mrs. Crutcher Harrison
Mrs. Phyllis Miller
Mr. Robert Renick
Dr. Ben Sheppard

Dr. E. L. Whigham, Superintendent of Schools
Dade County Public Schools
Miami, Florida 33132

January, 1973

Published by the School Board of Dade County

## Course Description

| 9027 | 48 | 9027.03 | Domestic Refrigerators |
|---|---|---|---|
| State Category Number | County Dept. Number | County Course Number | Course Title |

This quinmester course includes installation, electrical and mechanical servicing, malfunctions, trouble-shooting and repair, discharge, pumpdown and recharging the system.

Indicators of Success: Prior to entry into this course, the vocational student will display mastery of the skills indicated in "Refrigeration Controls: Electrical and Mechanical." (9027.02)

Clock Hours: 90, 135

# PREFACE

The following quinmester course outline 9027.03 is presented to provide the Major Appliance Service student with a fundamental knowledge of the procedures necessary to apply his understanding of the electrical circuitry and mechanical functioning components to successfully correct any malfunctions of the domestic refrigerator. The student will also be able to pump down a system and then recharge with the correct amount and type of refrigerant.

This quinmester course may be taught in a double quinmester session (2 hour block) for 90 clock hours or a triple quinmester (3 hour block) for 135 clock hours. In each instance the course consists of five instructional blocks; however the double session permits the student to cover each block in more detail and also provides added opportunity to practice and increase his skills.

Manipulative instructional methods include demonstration and shop use of actual appliances, tools and equipment as well as mock-ups. Related instruction is taught through lecture, books, service manuals, instructional sheets and chalk-board presentations. Students are expected to keep notebooks and to complete daily related and manipulative assignments; opportunity is provided for practicing newly learned manipulative skills.

An adjunct to the listed instructional methods is provided through the instructors utilization of audiovisual equipment and materials.

This quinmester course was developed through the cooperative efforts of the instructional and supervisory personnel, the Quinmester Advisory Committee, and the Vocational Curriculum Materials Service, and has been approved by the Dade County Vocational Curriculum Committee.

TABLE OF CONTENTS
with Suggested Hourly Breakdown


| | | Page |
|---|---|---|
| PREFACE | | i |
| GOALS | | iv |
| SPECIFIC BLOCK OBJECTIVES | | v |
| BIBLIOGRAPHY | | 5 |
| BLOCK | | |
| I. | ORIENTATION (5 Hours) | |
| | Introduction | 1 |
| | Student Responsibilities | 1 |
| | Course Benefits | 1 |
| II. | DOMESTIC HERMETIC REFRIGERATION SYSTEMS (20 Hours) | |
| | Domestic Refrigerator | 1 |
| | Controls and Coils | 1 |
| | Defrosting Systems | 2 |
| | Freezer System | 2 |
| | Functions of Freezer System | 2 |
| III. | DOMESTIC REFRIGERATOR AND FREEZER CABINETS (30 Hours) | |
| | Construction and Design | 2 |
| | Component and Desigh | 2 |
| | Cabinet Devices | 2 |
| | Finishes | 2 |
| | Installing a Refrigerator | 3 |
| | Preserving Food | 3 |
| | Review of Safety Precautions | 3 |
| IV. | SERVICING DOMESTIC HERMETIC UNIT (35 Hours) | |
| | External Servicing | 3 |
| | Internal Servicing | 3 |
| | Field Servicing | 4 |
| V. | QUINMESTER POST-TEST | 4 |
| APPENDIX: | QUINMESTER POST-TEST SAMPLES | 7 |

## GOALS

The student must be able to:

1. Explain and describe refrigerator construction, use tools and special equipment to diagnose and repair a refrigeration unit.

2. Correctly use the special refrigeration tools as used in the trade.

3. Transport and install a domestic refrigerator and instruct the customer in the care and operation of the refrigerator.

4. Troubleshoot and repair any malfunctioning component on the refrigerator.

5. Successfully complete the quinmester post-test.

## SPECIFIC BLOCK OBJECTIVES

### BLOCK I - ORIENTATION

The student must be able to:

1. Explain how a modern refrigerator is constructed and discuss shelving and component location as related to the most efficient operation of the appliance.
2. Correctly use hand tools and the special refrigeration tools that are necessary to service a modern refrigerator.

### BLOCK II - DOMESTIC HERMETIC REFRIGERATION SYSTEMS

The student must be able to:

1. Explain the hermetic refrigeration cycle and name all the components needed for proper operation.
2. Discuss the different methods of defrosting a modern refrigerator.
3. Describe the operations of the freezer system and explain how it functions.

### BLOCK III - DOMESTIC REFRIGERATOR AND FREEZER CABINETS

The student must be able to:

1. Identify the different types of refrigerator freezers and name the electrical components necessary for proper operation.
2. Demonstrate an understanding of the use of cabinet components, gaskets and seals needed for operation of a refrigerator.
3. Repair, paint, and refinish surfaces; repair a chipped porcelain surface.
4. Install and level a refrigerator in the customer's home, and give the customer instructions in the care and use of the appliance.
5. Discuss the principles of preserving food and list advantages of freezing food, also state how foods are prepared for freezing.

### BLOCK IV - SERVICING DOMESTIC HERMETIC UNIT

The student must be able to:

1. Service the cabinet and electrical components in a refrigerator using the basic and special hand tools and equipment.

2. Install the different valves to service a hermetic unit and explain how each functions.
3. Diagnose and start a stuck motor compressor unit using one of the methods used in the refrigeration trade.
4. Troubleshoot a refrigerator in a customer's home and diagnose and correct any malfunctions, then check and test unit for correct operations.

BLOCK V - QUINMESTER POST-TEST

The student must be able to:

1. Satisfactorily complete the quinmester post-test.

Course Outline

APPLIANCE REPAIR - ADVANCED - 9027
(Domestic Refrigerators)

Department 48 - Quin 9027.03

I. ORIENTATION

A. Introduction
1. History of domestic refrigerators
2. Cabinet, designs and construction
3. Component location

B. Student Responsibilities
1. Safety Regulations
a. Protective clothing
b. Shop and school rules
2. Tool and equipment care
a. Shop tools
b. Special tools
c. Testing equipment

C. Course Benefits
1. Career opportunities
a. Field technician
b. Shop technician
c. Supervisor, manager
2. Learning new and improving basic techniques and skills
a. Meter reading
b. Identification and use of tools
c. Interpretation of electrical schematics

II. DOMESTIC HERMETIC REFRIGERATION SYSTEMS

A. Domestic refrigerator
1. Development
2. Hermetic cycles
3. No frost cycles
4. Refrigerant controls
5. Hermetic compressor designs
6. Condenser designs
7. Evaporator coils

B. Controls and Coils
1. Forced convection coils
2. Liquid and suction lines
3. Air flow control
4. Electrical circuits
5. Electrical circuit accessories

C. Defrosting Systems
   1. Hot gas defrost system
   2. Electric heater defrost system

D. Freezer System
   1. Freezer refrigerants
   2. Freezer refrigerant controls
   3. Freezer motor controls
   4. Freezer alarm system
   5. Freezer condensing units
   6. Freezer motor compressors

E. Functions of Freezer system
   1. Defrosting frozen food systems
   2. Starting freezer units
   3. Cycling of freezers
   4. Shutting down freezers
   5. Freezer unit troubles
   6. Inefficient condensing unit
   7. Inefficient compressor
   8. Servicing frozen food unit

III. DOMESTIC REFRIGERATOR AND FREEZER CABINETS

A. Construction and Design
   1. Cabinet types
   2. Materials used
   3. Door construction
   4. Shelving design and construction
   5. Types of insulation
   6. Freezer cabinet construction
   7. Types of freezer cabinets

B. Component Location
   1. Condensing unit location
   2. Evaporator location
   3. Electric control location
   4. Freezer component location

C. Cabinet Devices
   1. Cabinet hardware
   2. Cabinet hardware repair
   3. Cabinet gaskets
   4. Cabinet assembly devices
   5. Cabinet accessories

D. Finishes
   1. Refinishing painted surfaces
   2. Cleaning finishes
   3. Porcelain repair

E. Installing a Refrigerator
   1. Using hand truck
   2. Uncrating and location
   3. Leveling
   4. Electrical connections
   5. Customer instructions

F. Preserving Food
   1. Principles of preserving food
   2. Advantages of freezing food
   3. Preparation of food for freezing
   4. Storage time for frozen food

G. Review of Safety Precautions
   1. Safe use of equipment
   2. Proper clothing
   3. Goggles when working with refrigerants
   4. Know refrigerants

IV. SERVICING DOMESTIC HERMETIC UNIT

A. External Servicing
   1. Tools and equipment
      a. Proper use of hand tools
      b. Proper use of special refrigeration tools
      c. Proper use of electrical test equipment
   2. Service operations
      a. Cabinet and hardware
      b. Cleaning
      c. Noise
      d. Electrical
         (1) Controls
         (2) Lights
         (3) Relay
         (4) Capacitors
         (5) Motor terminals
         (6) Defroster
         (7) Heaters
   3. Hermetic refrigeration valves
      a. Service valves
      b. Valve adapters
      c. Process tube fittings
      d. Tube mounter valves
      e. Schrader valves

B. Internal Servicing
   1. Hermetic refrigerating unit
      a. Motor windings
      b. Operation of motor compressor unit
      c. Methods of starting stuck units
      d. Diagnosing and correcting malfunctions

2. Removal of unit from system
    a. Purging unit
    b. Removing unit from system
    c. Installing unit in system
    d. Charging unit
    e. Testing unit

C. Field Servicing - Trouble Shooting Hermetic Unit in Field
    1. Diagnosing trouble
    2. Correcting malfunction
    3. Checking and testing unit

V. QUINMESTER POST-TEST

# BIBLIOGRAPHY
(Domestic Refrigerators)

Basic References:


1. Marsh, Warren R. and Olivio C. Thomas. Principles of Refrigeration. Albany, N. Y.: Delmar, 1966 Pp 374.

2. Althouse, Andrew D., et. al. Modern Refrigeration and Air Conditioning. Homewood, Illinois: Goodheart-Willcox Co., Inc., 1968 Pp 1120.

3. Edwin P. Anderson. Home Appliance Servicing. New York, N. Y.: Howard W. Sams and Co., Inc. 1967 Pp 600.

4. Tricomi, Ernest. How to Repair Major Appliances. New York, N. Y.: Howard W. Sams and Co., Inc. 1964 224 pages.


Supplementary References:


5. Domestic Refrigeration. Master Publications, Inc., Los Angeles, California 80.


Manufacturers Manuals:


6. Basic Electrical Refrigeration Controls. Booklet A-10 #82130, Whirlpool Corp. LaPorte, Indiana.

7. Use and Care of Test Instruments. Booklet G-5 #828439 Whirlpool Corp. LaPorte, Indiana.

8. Brazing-How and Why. Booklet G-9 #829003, Whirlpool Corp., LaPorte, Indiana.


Audiovisual Aids:

Slides and Records:


1. Definitions #GTR-1, 34 slides, Color, 1970, Carrier Air Conditioning Co.

2. Refrigeration Cycle #GTR-2, 30 slides, Color.

Filmstrips and Cassette Tapes:

3. Use and Care of Test Instruments. Filmstrip G-5 Whirlpool Corporation. #828440.

4. Use and Care of Test Instruments. Cassette G-5 Whirlpool Corporation #828459.

5. Brazing-How and Why. Filmstrip G-9, Whirlpool Corporation #829004.

6. Brazing-How and Why. Cassette G-9, Whirlpool Corporation #829005.

7. Basic Electrical Refrigeration Controls. Filmstrip R-10. Whirlpool Corporation #821229.

8. Basic Electrical Refrigeration Controls. Cassette R-10. Whirlpool Corporation #821228.

# A P P E N D I X

## Quinmester Post-Test Samples

QUINMESTER POST-TEST

Name_____Date_____Score_____

I. TRUE-FALSE

_____ 1. The modern refrigerator incorporates components specially made for the particular appliance.

_____ 2. Safety regulations are not important guides to follow when working on the job.

_____ 3. Insulation is very important in the construction of every refrigerator.

_____ 4. The evaporator should be covered with an inch of frost at all times.

_____ 5. The refrigerator cabinet must be as airtight as possible.

_____ 6. Some evaporators are defrosted automatically.

_____ 7. Some freezers have an alarm system to warn the customer the freezer is not operating.

_____ 8. Refrigerator shelves can be covered with foil.

_____ 9. The door gasket has to be as airtight as possible.

_____ 10. Featheredging is important when preparing a surface to be refinished.

QUINMESTER POST-TEST

Name_____Date_____Score_____

II. MULTIPLE CHOICE

1. The best method of ridding a system of moisture is by (a) evacuating (b) purging.

2. The best component to use for the evacuation of a new system is (a) a vacuum pump (b) the compressor.

3. The type of compressor that should never be used to pull a vacuum on its own system is the (a) reciprocating (b) hermetic.

4. A system is charged in less time when the refrigerant is in (a) vapor form (b) liquid form.

5. A new installation may be charged with refrigerant from (a) the high side (b) the low side (c) either high or low side (d) none of the above.

6. Which is the most popular insulation (a) styrofoam (b) cellotex (c) cork (d) glass wool (e) rigid urethane.

7. Breaker strips are usually made of (a) steel (b) plastic (c) aluminum (d) copper.

8. Where is the mullion strip located (a) in the freezer door (b) in the provision door (c) next to the evaporator (d) between the freezer compartment and provision compartment.

9. The inner lining of the domestic refrigerator is made of (a) sheet steel (b) aluminum (c) fiber glass (d) iron.

10. What type of relay does not need electromagnets (a) magnetic type (b) boltage type (c) hot wire type (d) amperage type.

## ANSWER KEY TO QUINMESTER POST-TEST

I. TRUE-FALSE

1. True
2. False
3. True
4. False
5. True
6. True
7. True
8. False
9. True
10. True

II. MULTIPLE CHOICE

1. a
2. b
3. b
4. b
5. c
6. d
7. b
8. d
9. a
10. c